TUNG-SOL

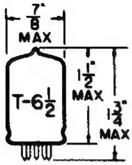
TWIN TRIODE

MINIATURE TYPE

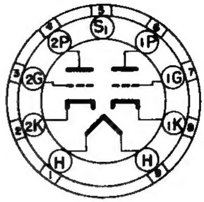
COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.35 AMP.
AC OR DC

ANY MOUNTING POSITION



GLASS BULB



BOTTOM VIEW
MINIATURE BUTTON
9 PIN BASE
8CJ

THE 5670WA IS A RUGGEDIZED, MEDIUM MU, TWIN TRIODE OF THE NINE-PIN MINIATURE CONSTRUCTION. THE TWO TRIODE SECTIONS ARE ELECTRICALLY INDEPENDENT WITH A SHIELD BETWEEN SECTIONS BROUGHT OUT TO A SEPERATE BASE PIN. THE 5670WA MAY BE USED IN SUCH GENERAL PURPOSE APPLICATIONS AS AMPLIFIER, MIXER, OSCILLATOR AND MULTIVIBRATOR CIRCUITS OVER A FREQUENCY RANGE OF AF. THROUGH VHF. IT MAY ALSO BE OPERATED AS AN OSCILLATOR AT FREQUENCIES AS HIGH AS 800 MC IN AN OPEN-CIRCUITED RESONANT LINE OSCILLATOR WHEN THE TWO TRIODE SECTIONS ARE CONNECTED IN PARALLEL. CONTROLS ON THE PRODUCT AVERAGE FOR SUCH CHARACTERISTICS AS PLATE CURRENT, TRANSCONDUCTANCE AND AMPLIFICATION FACTOR ASSURE THAT THESE CRITICAL CHARACTERISTICS WILL REMAIN WELL CENTERED. SINCE IT MUST BE ABLE TO WITHSTAND SEVERE MECHANICAL TESTS TO MEET TEST SPECIFICATIONS, THE 5670WA IS ESPECIALLY SUITED FOR USE IN MILITARY AND INDUSTRIAL AIRBORNE EQUIPMENT WHICH MAY BE SUBJECTED TO SEVERE SHOCK AND VIBRATION.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT SHIELD	
PLATE TO GRID (EACH SECTION)[A] (RATED)	1.1	μμf
MAXIMUM	1.4	μμf
MINIMUM	0.8	μμf
OUTPUT (RATED)	1.0	μμf
MAXIMUM	1.3	μμf
MINIMUM	0.7	μμf
INPUT (RATED)	2.2	μμf
MAXIMUM	2.7	μμf
MINIMUM	1.7	μμf
MAXIMUM PLATE TO PLATE (RATED)	0.10	μμf

RATINGS

ABSOLUTE MAXIMUM VALUES

HEATER VOLTAGE	6.3±10%	VOLTS
MAXIMUM DC PLATE VOLTAGE	330	VOLTS
MAXIMUM PLATE DISSIPATION, EACH SECTION	1.65	WATT
MAXIMUM HEATER-CATHODE VOLTAGE	±100	VOLTS
MAXIMUM DC CATHODE CURRENT, EACH SECTION[AA]	18	mAdc

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A_1 AMPLIFIER

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.35	AMP.
PLATE VOLTAGE	150	VOLTS
CATHODE RESISTOR (EACH SECTION)	240	OHMS
PLATE CURRENT (EACH SECTION)	8.2	mA
TRANSCONDUCTANCE (EACH SECTION)	5 500	μMHOS
AMPLIFICATION FACTOR	35	
GRID VOLTAGE (APPROX.) FOR Ib = 10 μa	-8	VOLTS

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS – CONT'D.

CLASS AB_1 AMPLIFIER

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.35	AMP.
PLATE VOLTAGE	300	VOLTS
CATHODE RESISTOR	800	OHMS
AF GRID TO GRID VOLTAGE (RMS)	14	VOLTS
ZERO-SIGNAL PLATE CURRENT (EACH SECTION)	4.9	mA
MAXIMUM SIGNAL PLATE CURRENT (EACH SECTION)	6.3	mA
LOAD IMPEDANCE (PLATE-TO-PLATE)	27 000	OHMS
TOTAL HARMONIC DISTORTION	10	PERCENT
MAXIMUM SIGNAL POWER OUTPUT	1.0	WATT

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

E_f = 6.3V, E_b = 150Vdc, E_c = 0Vdc, R_k/k = 240 OHMS
EXCEPT AS MODIFIED BELOW

	INITIAL				500 HOUR LIFE TEST		
	INDIVIDUAL MIN.	INDIVIDUAL MAX.	PROD. MIN.	AVG. MAX.	INDIVIDUAL MIN.	INDIVIDUAL MAX.	
HEATER CURRENT	330	370	---	---	330	370	mA
HEATER-CATHODE LEAKAGE[B] (E_{hk} =±100Vdc)	---	±10	---	---	---	±10	μAdc
GRID CURRENT (1) (R_g =0.5 meg.)	0	-0.3	---	---	0	-0.3	μAdc
PLATE CURRENT (1)	5.9	10.5	7.3	9.1	---	---	mAdc
PLATE CURRENT (2) (E_c = 10Vdc, R_p=0.25 meg., R_k =0)	---	45	---	---	---	---	μAdc
TRANSCONDUCTANCE (1)	4500	6500	5125	5875	3850	6500	μMHOS
Δ AVG. TRANSCONDUCTANCE (1)	---	---	---	---	---	15	PERCENT
INSULATION OF ELECTRODES[C] (E_f=6.3V, E(g-all)= 100Vdc, g negative; E(p-all)= 300Vdc, p negative)							
R(g-all)	100	---	---	---	50	---	MEGOHM
R(p-all)	100	---	---	---	50	---	MEGOHM
PLATE CURRENT (1) DIFFERENCE BETWEEN SECTIONS	---	2.0	---	---	---	---	mAdc
TRANSCONDUCTANCE (2)[D] (E_f = 5.7V)	---	15	---	---	---	15	PERCENT
GRID CURRENT (2)[E] (E_f = 7.0V)	0	-0.5	---	---	---	---	μAdc
AMPLIFICATION FACTOR	26	44	30	40	---	---	

SPECIAL REQUIREMENTS

	MIN.	MAX.	
VARIABLE FREQUENCY VIBRATION[H] (R_p=2000, R_k=0, E_{c1}=-3Vdc)	---	100	mVac
VIBRATIONAL FATIGUE[F]	---	---	
SHOCK[G] (HAMMER ANGLE =42°, E_{hk}=100Vdc, HEATER POSITIVE, R_g=0.1 meg.)	---	---	
POST SHOCK AND VIBRATIONAL FATIGUE TEST END POINTS			
LOW FREQUENCY VIBRATION	---	300	mVac
HEATER-CATHODE LEAKAGE	---	±30	μAdc
TRANSCONDUCTANCE (1)	3850	---	μMHOS
GRID CURRENT (1)	0	-0.6	μAdc
GLASS STRAIN[J]	---	---	
CONTINUITY AND SHORT[K]	---	---	
RF NOISE[LBM] (E_p=250Vdc, E_{cal}=1.1 mVac, C_k=0.2 μf)	---	3.0	mW

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TUNG-SOL

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SPECIAL REQUIREMENTS – CONT'D.

	MIN.	MAX.	
NOISE AND MICROPHONICS[NBMP] (E_f=6.3Vac, E_{hk}=0, E_{bb}=250Vdc, E_{c1}=0, R_p=10,000)	---	200	mVac
LOW FREQUENCY VIBRATION[QB] (E_c =-3Vdc, R_k=0, R_p=2000)	---	100	mVac
LOW PRESSURE VOLTAGE BREAKDOWN[R] (PRESSURE =55±5mm mercury, temp=25±5°C, HUMIDITY=0, VOLTAGE=500Vac, 60 CYCLES, SINUSOIDAL WAVEFORM)	500	---	Vac
1 HOUR STABILITY LIFE TEST INTERMITTENT LIFE TEST CONDITIONS	---	---	
STABILITY LIFE TEST END POINTS Δ TRANSCONDUCTANCE (1)	---	10	PERCENT
100 HOUR SURVIVAL RATE LIFE TEST INTERMITTENT LIFE TEST CONDITIONS OR EQUIVALENT	---	---	
HEATER CYCLING LIFE TEST (E_f=7.5V, E_{hk}=135Vdc, HEATER POSITIVE, E_c=E_b=0)	---	---	
HEATER CYCLING LIFE TEST END POINTS HEATER–CATHODE LEAKAGE	---	±20	μAdc
INTERMITTENT LIFE TEST (E_{hk}=135Vdc, HEATER POSITIVE, R_g=0.5 meg, min. BULB TEMPERATURE =+165°C)	---	---	

NOTES

[A] INTERNAL SHIELD AND HEATER CONNECTED TO CATHODE.

[AA] DIFFICULTY MAY BE ENCOUNTERED IF THIS TUBE IS OPERATED FOR LONG PERIODS OF TIME WITH VERY SMALL VALUES OF CATHODE CURRENT.

[B] TIE 1p TO 2p, 1g TO 2g, 1k TO 2k. (PARASITIC SUPPRESSORS OF 50 OHMS MAXIMUM PERMITTED.)

[C] SEE MIL-E-1C 4.8.2

[D] THE VALUE OF TRANSCONDUCTANCE (2) SHALL APPLY TO INDIVIDUAL TUBES AND IS EXPRESSED:

$$\frac{(\text{SM AT } 6.3)-(\text{SM AT } 5.7)}{(\text{SM AT } 6.3)} \times 100$$

[E] PRIOR TO TEST TUBES TO BE PREHEATED FIVE (5) MINUTES AT FOLLOWING CONDITIONS. TEST IMMEDIATELY AFTER PREHEATING. E_f = 7.0V, E_{c1} =0 Vdc, R_k = 240 OHMS, E_b = 150vdc, R_g = 0.5 MEG.

[F] SEE MIL-E-1C 4.9.20.6

[G] SEE MIL-E-1C 4.9.20.5

[H] SEE MIL-E-1C 4.9.20.3

[J] GLASS STRAIN TEST CONSISTS OF COMPLETELY SUBMERGING THE TUBE INTO BOILING WATER (97°C-100°C) FOR A PERIOD OF 15 SECONDS, THEN IMMEDIATELY PLUNGING INTO COLD WATER (0±3°C). THE AMOUNT OF WATER SHALL BE AT LEAST TWO (2) LITERS PER FIFTEEN TUBES. TUBES FOR THIS TEST SHALL HAVE BEEN EXHAUSTED A MINIMUM OF 48 HOURS PRIOR TO PERFORMANCE OF THIS TEST. REJECT FOR EVIDENCE OF AIR LEAK.

[K] SEE MIL-E-1C 4.7.5

[L] SEE MIL-E-1C 4.10.3.1

[M] TIE CATHODES TOGETHER AND GROUND THRU A 240 OHM RESISTOR. GRIDS ARE GROUNDED.

[N] SEE MIL-E-1C 4.10.3.5

[P] THE CATHODE RESISTOR SHALL BE SHUNTED WITH A CAPACITIVE REACTANCE NOT EXCEEDING 3 OHMS @ 60 CYCLES.

[Q] SEE MIL-E-1C 4.9.20.4

[R] BREAKDOWN SHALL BE DEFINED AS THE VOLTAGE AT WHICH ARCING OCCURS BETWEEN ANODE BASE PIN AND ADJACENT PINS.

5670WA

PREMIUM TUBE